



Knowledge of gestational diabetes mellitus among pregnant women at TAY Nguyen university hospital

Nguyen Thi Kim Quyen, Thai Mai Thuy, Phan Thi Huyen Trang and Nguyen Thi Thu Hang

Nursing Department, Tay Nguyen University, Buon Ma Thuot City, Dak Lak 631000, Vietnam
University of Danang, School of Medicine and Pharmacy, Da Nang city, 50000, Vietnam

Corresponding Author: Nguyen Thi Kim Quyen

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Abstract

This study assessed the knowledge of pregnant women regarding gestational diabetes at Tay Nguyen University Hospital, emphasizing the critical role of prenatal care in obstetric clinical practice. Enhancing this knowledge is essential for improving prenatal care quality. A cross-sectional study was conducted with 107 pregnant women who voluntarily participated, using a survey questionnaire adapted and supplemented for suitability by Nguyen Thi Thuy Linh *et al.* (2022) for data collection. The results showed that the proportion of pregnant women with correct knowledge about gestational diabetes mellitus (GDM) was 36.5%. The study emphasizes the urgent need to enhance education on gestational diabetes mellitus for pregnant women in order to bridge the knowledge gap and improve their competence in this critical area.

Keywords: Gestational diabetes mellitus, knowledge, Tay Nguyen University Hospital, pregnant women

Introduction

Gestational Diabetes Mellitus (GDM) can develop during pregnancy. characterized by high blood sugar levels that were not present before pregnancy. This condition has significant implications for the health of both the mother and the fetus. including the risks of preterm births. preeclampsia. and increased likelihood of developing type 2 diabetes later in life (American Diabetes Association. 2020) [1]. Despite its prevalence. Many pregnant women lack sufficient knowledge of GDM. This can hinder their effective management and prevention. Studies have shown that maternal education and awareness of disease risk factors. symptoms. Treatment options can significantly improve health outcomes (Sacks *et al.*. 2012) [8]. Furthermore. This knowledge gap is evident across various populations. with factors, such as socioeconomic status. ethnicity. and healthcare access, which influences a woman's understanding of the condition (Liu *et al.*. 2019) [4]. Globally, the incidence of GDM is increasing. It is crucial to implement comprehensive educational programs targeting pregnant women to ensure timely detection and effective management (World. 2016) [14]. By increasing awareness. Women can take proactive steps to prevent or manage GDM. leads to better health outcomes for both mothers and children (Kaur *et al.*. 2021) [3].

This study was conducted at Tay Nguyen University Hospital to assess knowledge of gestational diabetes mellitus (GDM) among pregnant women. Due to the limited research on this topic in Vietnam. this study aims to fill the gap and contribute valuable insights to the global body of

knowledge. The objectives of the study include evaluating the level of knowledge of pregnant women about gestational diabetes mellitus. The findings will provide a foundational understanding to guide future research and improve education on prenatal care.

Materials and methods

Study Design and Participants

This cross-sectional observational study assessed the knowledge of gestational diabetes mellitus (GDM) among pregnant women at Tay Nguyen University Hospital. Vietnam. The study used a pre-designed questionnaire developed by Nguyễn Thị Thuỳ Linh. with modifications and additions to suit the local context (Nguyễn Thị Thuỳ Linh *et al.*. 2022) [6]. The questionnaire consisted of two sections. The first section collected demographic data (education level. occupation. family and personal medical history). while the second section assessed knowledge through 22 multiple-choice or single-choice questions related to the condition. along with direct interviews with the pregnant women.

Sample size

The sample size was determined using WHO guidelines with a 95% confidence level ($\alpha = 0.05$). an anticipated proportion (p) of 0.5. and an absolute precision (d) of 0.1.

$$n \geq \frac{Z_{1-\alpha/2}^2(1-p)p}{d^2}$$

This calculation yielded a minimum sample size of 97. Total sampling was employed, resulting in a final sample of 107 pregnant women.

Data Collection and Analysis

Data collection process: First, contact the list of pregnant women who visit the obstetrics department. Then, interview the selected mothers to collect information based on each question in the questionnaire to avoid confusion or omissions. Finally, conduct self-research data collection to verify and ensure all necessary information is completed.

Data analysis process: The collected information was encoded using the data management software Epidata3.1, and then the data were analyzed using STata 16 software. Correct knowledge about diabetes was measured by the percentage of correct answers ($\geq 75\%$).

Ethical Approval

The study was conducted with the approval of the President of Tay Nguyen University and the Board of Directors of the Tay Nguyen University Hospital. The research participants

were provided with complete information about the content and objectives of the study and voluntarily agreed to participate. All collected data were managed by the researchers, kept confidential, and used solely for research purposes.

Result and Conclusion

Distribution of the participants

The data in table 3.1 provides a comprehensive demographic breakdown of 107 pregnant women at Tay Nguyen University Hospital. Most participants are aged ≤ 35 years (86%) and have experienced pregnancy at least twice (72.9%). A significant proportion have a gestational age of > 28 weeks (71%), while the majority have an education level of \leq high school (77.6%). Regarding occupation, 73.8% are employed outside government positions, with only 26.2% working as government employees. These findings indicate that the study population primarily consists of younger women with multiple pregnancies, advanced gestational ages, lower educational attainment, and non-governmental occupations.

Table 3.1: Distribution of General Characteristics of Study Subjects

Baseline characteristic		Frequency (n)	Percentage (%)
Age	≤ 35 years old	92	86
	> 35 years old	15	14
Number of pregnancies	1 time	29	27.1
	≥ 2 times	78	72.9
Gestational age	< 24 weeks	20	18.7
	24-28 weeks	11	10.3
	> 28 weeks	76	71
Educational level	College/University/ Graduate	24	22.4
	\leq high school	83	77.6
Occupation	Government employees	28	26.2
	Other	79	73.8

Pregnant women's knowledge about gestational diabetes.

The results from Table 3.2 reveal that 45.8% of pregnant women identified gestational diabetes mellitus (GDM) as a condition where blood sugar levels are higher than normal and first detected during pregnancy, while 38.3% believed GDM occurs between 24-28 weeks of pregnancy. However, 32.7% of the participants did not know about GDM. This finding is lower than the study by Nguyễn Thị Thùy Linh *et al.* (2022) [6], where 52.8% identified GDM correctly as a condition with elevated blood sugar detected during pregnancy, and 60% acknowledged its occurrence between 24-28 weeks. Notably, only 3.9% of participants in Nguyễn's study were unaware of GDM, a significantly lower percentage compared to the 32.7% in this research. Similarly, Jie Tan *et al.* (2023) [10] reported that 36.67% of pregnant women correctly defined GDM, which aligns more closely with our findings. Regarding risk factors, overweight and obesity were identified as the most significant risk by 80.4% of respondents (Table 3.2). This rate is higher than the 70.3% reported by Nguyễn Thị Thùy Linh *et al.* (2022) [6], 31.35% in the study by Balaji Bhavadharin *et al.* (2017), and 28.04% by Rosemary N. Ogu *et al.* (2020) [7]. These results highlight a critical gap in

health education for pregnant women, particularly in understanding the concept and risk factors of GDM. Raising awareness is essential to mitigate the adverse effects of GDM, as it not only impacts maternal health but also poses long-term risks to the fetus (American Diabetes Association, 2020) [1]. Strengthening health counseling and educational programs at healthcare facilities, especially for high-risk groups, is crucial for early detection and prevention (World Health Organization, 2021) [15].

The data from Figure 3.2 that a preference for sweet foods is the most frequently reported symptom (73.8%) among the individuals surveyed, followed by excessive fatigue (67.3%) and rapid weight gain (55.1%). These symptoms are consistent with findings in studies on metabolic disorders and gestational diabetes mellitus (GDM), where cravings for sweet foods are often linked to insulin resistance or dysregulated glucose metabolism (American Diabetes Association, 2020) [1]. Excessive fatigue and rapid weight gain may reflect underlying metabolic strain and hormonal fluctuations, common in conditions like GDM or other endocrine disorders. Interestingly, excessive hunger (41.1%) and larger fetus size relative to gestational age (30.8%) are also notable symptoms.

Table 3.2: Knowledge of Pregnant Women about the Concept of Gestational Diabetes and Risk Factors for Gestational Diabetes

Pregnant Women's Knowledge	Frequency (n)	Percentage (%)
Concept of Gestational Diabetes		
A metabolic disorder characterized by high blood sugar	27	25.2
A condition where blood sugar levels are higher than normal, first detected during pregnancy	49	45.8
Occurs during pregnancy between 24–28 weeks	41	38.3
Do not know	35	32.7
Risk Factors for Gestational Diabetes		
Age ≥ 25	18	16.8
History of gestational diabetes in previous pregnancies	67	62.6
History of blood sugar disorders	34	31.8
History of unexplained miscarriage or stillbirth	25	23.4
Previously gave birth to a baby weighing ≥4000 grams	30	28
Family history of diabetes (parent, sibling)	44	41.1
Overweight or obesity	86	80.4
Hypertension	53	49.5
Do not know	15	14

Excessive hunger (polyphagia) often arises from the body's inability to efficiently use glucose for energy, a hallmark of diabetes-related conditions (American Diabetes Association, 2020; WHO, 2021) [1]. The observation of larger fetal size aligns with macrosomia, a common outcome in pregnancies affected by GDM, and underscores the importance of early detection and management to prevent complications during delivery (International Diabetes Federation, 2022) [2]. Symptoms such as excessive thirst (18.7%) and frequent urination (17.8%) are reported less frequently, though they are classic signs of hyperglycemia. This variation might

suggest that some individuals experience milder forms of hyperglycemia or may overlook these symptoms, which warrants further investigation and public health education (Ogu *et al.*, 2020) [7]. The findings underscore the importance of raising awareness about these symptoms and their potential implications. Early recognition and appropriate medical interventions are crucial in managing conditions like GDM and preventing adverse outcomes for both mother and child. Healthcare providers must emphasize education on symptom awareness, particularly for high-risk populations.

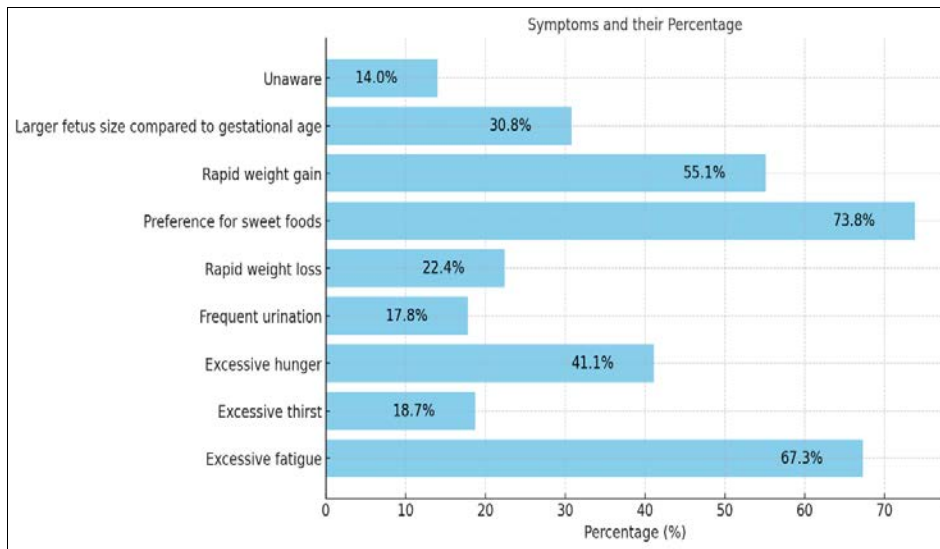


Fig 3.2: Knowledge about symptoms of gestational diabetes

The findings from Table 3.3 highlight significant gaps in knowledge among pregnant women regarding the timing of diagnosis, fasting blood sugar control levels, and appropriate healthcare facilities for gestational diabetes (GDM) screening. Over half of the participants (56.1%) were unaware of when GDM should be diagnosed, and 64.5% lacked knowledge about the fasting blood sugar control range. This lack of understanding may hinder early detection and timely management, increasing risks for adverse maternal and fetal outcomes (American Diabetes Association, 2020; WHO, 2021) [1]. Moreover, while provincial hospitals were the most recognized screening

facilities (70.9%), only 5.6% of respondents acknowledged smaller health stations. This indicates a lack of awareness or trust in local healthcare services, potentially limiting access to timely screening, especially in rural areas (Ogu *et al.*, 2020) [7]. The data underscores the urgent need for targeted health education campaigns to improve knowledge about GDM screening protocols and the availability of local healthcare resources. Such interventions should emphasize the importance of early diagnosis, fasting blood sugar monitoring, and utilizing community health stations for broader accessibility (International Diabetes Federation, 2022) [2].

Table 3.3: Knowledge of Pregnant Women about Timing of Diagnosis, Fasting Blood Sugar Control Levels and Healthcare Facilities for Gestational Diabetes Screening

Content	Frequency (n)	Percentage (%)	
Timing of Diagnosis	< 24 weeks	9	8.4
	24-28 weeks	33	30.8
	> 28 weeks	5	4.7
	Do not know	60	56.1
Fasting Blood Sugar Control Levels	< 3.9 mmol/l	12	11.2
	3.9 - 5.2 mmol/l	19	17.8
	> 5.2 mmol/l	7	6.5
	Do not know	69	64.5
Healthcare Facilities for Screening/Diagnosis	Commune/ward health stations	6	5.6
	District hospitals	34	31.8
	Provincial/City general hospitals	75	70.9
	Central-level general hospitals	55	51.4
	Do not know	31	29

The results from Table 3.4 reveal that while most pregnant women are aware of the severe risks posed by gestational diabetes mellitus (GDM), such as fetal complications (73.8%) and long-term maternal health impacts (68.2%), there remains a concerning proportion (4.7%) who underestimate its dangers. This lack of awareness could result in delayed or inadequate management, exacerbating health risks. Though many respondents were informed about immediate complications like high blood pressure, preeclampsia, and neonatal death, only 26.2% recognized the potential progression of GDM to type 2 diabetes. This gap in knowledge highlights an urgent need for health

education emphasizing the long-term metabolic consequences of GDM. Studies have shown that women with GDM are at a significantly higher risk of developing type 2 diabetes postpartum, which also predisposes offspring to metabolic disorders later in life (American Diabetes Association, 2020; WHO, 2021) [1]. These findings underscore the necessity of improving prenatal counseling and awareness campaigns. Such efforts should aim to address misconceptions, provide clear information on risks, and encourage preventive behaviors like dietary modifications and glucose monitoring (International Diabetes Federation, 2022; Ogu *et al.*, 2020) [2, 7].

Table 3.4: Knowledge of Pregnant Women About the Severity and Impact of Gestational Diabetes

content	Frequency (n)	Percentage (%)
Severity		
Can be fatal	40	37.4
Can have many effects on the fetus	79	73.8
Can cause long-term consequences for the mother	73	68.2
Not dangerous	5	4.7
Effects on the Mother		
Miscarriage. stillbirth	60	56.1
High blood pressure. preeclampsia	67	62.6
Premature birth	67	62.6
May progress to type 2 diabetes after birth	28	26.2
No complications	5	4.7
Effects on the Fetus		
Large baby	38	35.5
Stillbirth	55	51.4
May cause future health issues for the child	43	40.2
Child at risk for obesity	59	55.1
No complications	12	11.2

The data from Table 3.5 indicates a promising level of awareness among pregnant women, with 83.2% believing that gestational diabetes mellitus (GDM) is preventable. The most widely recognized preventive measures include proper nutrition (88.8%) and physical activity (74.2%), highlighting a good understanding of fundamental health principles. Many women also demonstrated awareness of specific dietary guidelines, such as reducing fat and sugar intake (84.1%). However, gaps in understanding persist. Only 24.3% of respondents identified dividing meals into smaller portions as a preventive measure, despite its established importance in stabilizing blood sugar levels (American Diabetes Association, 2020) [1]. Furthermore, while 79.4% were aware that physical activity should be

limited to under 30 minutes, 11.2% of participants lacked any knowledge about GDM prevention, reflecting the need for more comprehensive education. These findings suggest that although there is a strong foundation of awareness, more targeted interventions are needed to address misconceptions and provide nuanced education on effective preventive measures. Evidence shows that balanced nutrition, regular exercise, and proper portion control significantly reduce the risk of GDM and its associated complications (World Health Organization, 2021; Ogu *et al.*, 2020) [15]. Health campaigns and prenatal counseling programs should prioritize these aspects to improve prevention rates and ensure better outcomes for mothers and babies.

Table 3.5: Knowledge about Preventing Gestational Diabetes

content	Frequency (n)	Percentage (%)
Possibility of Prevention		
Yes	89	83.2
No	18	16.8
Preventive Measures		
Proper nutrition during pregnancy	79	88.8
Appropriate physical activity	66	74.2
Regular prenatal check-ups and gestational diabetes screening	66	74.2
Do not know	1	1.1
Dietary Guidelines for Prevention		
Divide meals into 5-6 smaller meals a day	26	24.3
Ensure adequate vitamins and minerals	85	79.4
Eat low fat and sugary foods	90	84.1
Drink plenty of water	41	38.3
Do not know	12	11.2
Physical Activity Duration		
< 30 minutes	85	79.4
≥ 30 minutes	22	20.6

Based on the total number of correct answers regarding knowledge of gestational diabetes in pregnant women, 68 women had incorrect knowledge, accounting for 63.5%, while 39 women had correct knowledge about gestational diabetes, making up 36.5% (Figure 3.1). The results of our study are higher than those of Ogu, R. *et al.* (2020) [15], who reported a correct knowledge rate of 26.2%, Nguyen Thi Thuy Linh *et al.* (2022) [6], with a rate of 21.7%, and the study by Truong Thi Tuyet Mai *et al.* [12]. at Can Tho Obstetrics and Gynecology Hospital in 2020, with a correct knowledge rate of 25.5% (Truong Thi Tuyet Mai *et al.*, 2020) [12]. However, our results are lower than those of Tran Thi Viet Ha *et al.* conducted at Nam Dinh Obstetrics and Gynecology Hospital, where the correct knowledge rate was 43.3% (Tran Thi Viet Ha *et al.*, 2022) [11], and Ngo Bich

Ngoc, who reported a knowledge rate of 71.8% (Ngo Bich Ngoc, 2022) [5]. Our findings are similar to those from a study at Tra Vinh Obstetrics and Pediatrics Hospital, which reported a correct knowledge rate of 35.3% (Vo Thi Thuy Linh *et al.*, 2024) [13]. This suggests a significant gap in awareness and understanding of gestational diabetes among the study population. The lack of knowledge could potentially lead to delays in diagnosis and improper management, which can result in complications for both the mother and baby. For example, untreated or poorly managed gestational diabetes can increase the risk of preterm birth, large birth weight, and long-term health issues such as type 2 diabetes for both the mother and child (American Diabetes Association, 2020; Schaefer-Graf *et al.*, 2018) [1, 9].

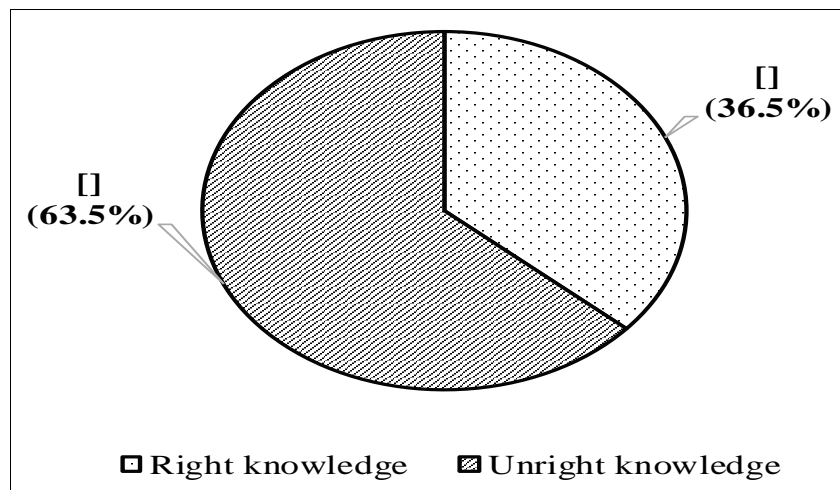


Fig 3.1: Pregnant women's knowledge about gestational diabetes.

Conclusion

The study reveals significant gaps in knowledge about gestational diabetes mellitus among pregnant women at Tay Nguyen University Hospital. Only 36.5% of participants demonstrated correct knowledge about GDM, which is higher than some previous studies but still indicates a substantial lack of awareness. This knowledge deficit spans various aspects of GDM, including its definition, risk factors, symptoms, diagnosis timing, and prevention

strategies. Improving knowledge about GDM is crucial for early detection, proper management, and prevention of complications for both mothers and babies. Healthcare providers should focus on comprehensive prenatal education, emphasizing risk factors, symptoms, diagnostic procedures, and preventive strategies. Future interventions should address specific knowledge gaps identified in this study, tailoring information to the local context and healthcare system. Additionally, further research is needed

to explore the factors influencing GDM knowledge and to develop effective educational strategies for this population.

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